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55 ST-JACQUES, MONTRÉAL, ~~June 21st~~ 2000
QUÉBEC, CANADA H2Y 3X2

Our File N° : 27266-0024

IN THE U.S. PATENT AND TRADEMARK OFFICE

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BY MESSENGER

S I R :

Enclosed please find an application for patent as identified below:

Inventor: BÉLIVEAU, Jean-Louis

Title: "STACKABLE CONSTRUCTION PANEL"

Priority: CANADA N° 2,298,170 of 11 February 2000

including the items indicated:

1. [X] Specification comprising 13 claims (2 indep.; 11 dep.; 0 multiple dep.)
2. [X] Abstract

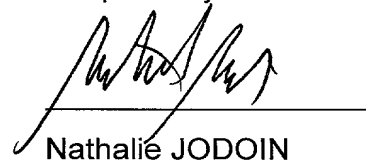
.../2

BÉLIVEAU, Jean-Louis...../2

3. [X] Declaration and Power of Attorney
4. [X] 6 drawings, 6 sheets (Figs. 1-6)
5. [X] Form PTO-1595 together with an assignment in favor of: **POLYFORM**
A.G.P. INC.
6. [X] Verified Statement Claiming Small Entity Status – SMALL BUSINESS
CONCERN
7. [X] Information Disclosure Statement, 1 sheet of Form PTO-1449 with
copies of the listed documents
8. [X] Bankdraft in the amount of **\$385.00** (**\$345.00** filing; **\$40.00** recording)

Should the above fee be insufficient, please charge the deficiency to my office's
account No. 18-1640 and notify me.

Respectfully submitted,



Nathalie JODOIN

Reg. N^o 41,558

Patent Agent

NJ\rb

Encls.: as stated above; and
A/R Card.

Nathalie JODOIN

(514) 987-6242

Applicant or Patentee: Jean-Louis BÉLIVEAU
Serial or Patent No.: _____ No.: _____
Filed or Issued: _____
For: STACKABLE CONSTRUCTION PANEL

**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(f) and 1.27(c)) - SMALL BUSINESS CONCERN**

I hereby declare that I am:
☐ the owner of the small business concern identified below:
☒ an official of the small business concern empowered to act on behalf
of the concern identified below:

NAME OF CONCERN: POLYFORM A.G.P. INC.
ADDRESS OF CONCERN: 454 Edouard, Granby, Québec, CANADA J2G 3Z3

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.1301 through 121.1305, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled STACKABLE CONSTRUCTION PANEL

by inventor(s) Jean-Louis BÉLIVEAU

described in:

☒ the specification filed herewith
☐ application serial No. _____ filed on _____
☐ patent No. _____ issued on _____

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights in the invention is listed below* and no rights to the invention are held by any person, other than the inventor, who could not qualify as an independent inventor under 37 CFR 1.9(c) if that person made the invention, or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

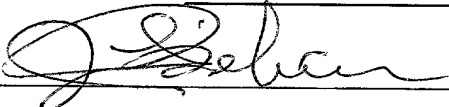
NAME _____
ADDRESS _____
☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

☐ See attached sheet for additional person(s), concern(s) or organization(s)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such wilful false statements may jeopardise the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING: Jean-Louis Béliveau
TITLE OF PERSON OTHER THAN OWNER President
ADDRESS OF PERSON SIGNING 1485 chemin Georgeville, Magog, Quebec, CANADA, J1X 3W4

SIGNATURE  DATE: 12/06/00

STACKABLE CONSTRUCTION PANEL

FIELD OF THE INVENTION

The present invention relates generally to wall forms of the type comprising pairs of opposed form walls each formed of a plurality of stacked rows of plastic foam panels for receiving flowable materials such as concrete. More particularly, it relates to interlocking foam panels or blocks used to build those form walls.

BACKGROUND OF THE INVENTION

A number of different systems and methods currently exist for making insulating forms for casting a concrete wall. Often, these systems comprise pairs of opposed foam panels generally made of rigid foam like polystyrene, which define concrete-receiving cavities therebetween. Those pairs of foam panels are placed one above the other so to form the wall form. Once the concrete is solidified, the form walls remain in place to insulate the wall. Those form walls are typically maintained in spaced and parallel relationship before the pouring of concrete by means of connectors comprising a pair of parallel lateral attachment flanges each embedded in one of the two opposed foam panels, and a connecting web interconnecting the flanges.

The piling up of such panels is performed on the site of construction. One object in this field is to obtain foam panels that would allow, on one hand, an easy and very rapid piling up without losing time and, on the other hand, would allow construction of a stable and solid stacking that will not likely disassemble prior to the pouring of concrete. As can be easily understood, as soon as the concrete is poured, the chances that the stack collapses or disassembles is greatly reduced.

An example of a prior art attempt in this field is given in US 5,428,933 which discloses an insulating construction panel having a top and a bottom edge each

provided with interconnecting members consisting of at least two rows of alternating projections and recesses. The recesses of one row are adjacent to a projection of the other row, such as a checkerboard, whereby the insulation panel can be interconnected with a like member in a bi-directional or reversible manner. One drawback encounters with such panels is that the projections at the corners and along the edges tend to break easily. Furthermore, when such panel is not very thick, it easily tips over once stacked over a like panel. Other examples of insulating construction panel are shown in US patents 3,895,469; 4,229,920; 4,704,429; 4,884,382; 4,885,888 and 4,894,969.

There is thus still presently a need for an improved insulating construction panel for building form walls.

SUMMARY OF THE INVENTION

An object of the present invention is to propose a stackable insulating foam panel that will satisfy the above-mentioned need, and more particularly to propose an improved stackable foam panel that allows the construction of a stable and solid stack.

In accordance with the present invention, that object is achieved with a stackable insulating foam panel having a top side and a bottom side each including a median row of alternating projections and recesses having a similar complementary shape, the median row being disposed between two coplanar edge surfaces. Each projection of the top side is opposed to a recess of the bottom side whereby the top side and/or the bottom side of the panel can be interconnected with either the top side or the bottom side of a like panel.

The present invention also concerns a wall form assembly comprising opposed foam panels, as described above, disposed in parallel relationship to make a wall form for receiving a flowable material such as concrete and a plurality of

connectors for tying the opposed foam panels together. More particularly, the form wall assembly comprises:

- a first and a second opposed foam panels in parallel relationship; and
- a plurality of connectors hingely tying together the first and second foam panels, whereby the tied foam panels are movable between an extended position where the foam panels are spaced-apart to make the form and a collapsed position where the foam panels are brought close to each other.

As can be appreciated, the two coplanar edge surfaces of the foam panel act as shoulders or abutments for the edge surfaces of an interconnected like panel, and thus help to solidify or stabilise a stack built with foam panels according to the present invention.

Other features and objects of the present invention will become more apparent from the description that follows of a preferred embodiment, having reference to the appended drawings and given as examples only as to how the invention may be put into practice.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective fragmentary view of a form wall assembly according to a preferred embodiment of the present invention;

Figure 2 is a top view of the form wall assembly of figure 1 showing the relief of the top side of the foam panels;

Figure 3 is a cross-sectional side elevation view of the left panel of the form wall assembly of figure 2 along line III-III showing also the top side of a lower panel;

Figure 4 is a cross-sectional side elevation view of the form wall assembly of figure 2 along line IV-IV showing an upper and a lower row of stacked foam panels;

Figure 5 is a perspective view of a connector according to a preferred embodiment of the invention, shown without its right anchor member and a portion of the web member; and

Figure 6 is a side view in partial transparency of a portion of the connector of figure 5.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to figure 1, a form wall assembly (10) according to the present invention is suitable to make a form for receiving flowable material such as concrete or the like. The form obtained is of the type comprising a plurality of stacked insulating horizontal rows of coplanar substantially rectangular foamed plastic panels (14) abutting one another along horizontal and vertical sides thereof. More particularly, the form wall assembly (10) comprises a first foam panel (14a) opposed to a second foam panel (14b) in spaced and parallel relationship, and tied together by means of a plurality of connectors (16), as best seen in figure 4. The foam panels (14) are movable between an extended position, as shown in figure 1, where the foam panels (14) are spaced-apart to make the form and a collapsed position, not illustrated, where the foam panels (14) are brought close to each other, mainly for shipping purposes.

The foam panels (14) each have a top side (15) opposite a bottom side (17) and, as illustrated in figures 1 and 2, each of the top side (15) and the bottom side (17) is provided with a median row (13) of alternating projections (18) and recesses (19) having a similar complementary shape. This median row (13) is disposed between two coplanar edge surfaces (50) bordering the edges of the panel (14). It has to be noted that the coplanar edge surfaces (50) are preferably

provided with a width sufficiently large so as to offer an increased stability between interlocked panels (14).

As best seen in figure 3, each projection (18) and recess (19) of the top side (15) of one panel (14a) is opposed respectively to a recess (19) and a projection (18) of the bottom side (17) of the same panel (14a), and is facing respectively
 5 a recess (19) and a projection (18) of the top side (15) of the other panel (14b), when the pair of panels (14a and 14b) are in the extended position as in figure 1 or 2, whereby the pair of panels (14a, 14b) can be interconnected with a like pair of panels.

10 Mainly because of the manufacturing process, the projections (18) and the recesses (19) are generally rectangular. However, projections and recesses of other shapes such as circular, oblong, square etc. could also be used

In order to prevent the deterioration of the projection (18), the present invention prefers using projections (18) with rounded-corners. Nevertheless, projections
 15 (18) with square-corners or other forms, would still be efficient.

Also preferably, each of the projections (18) and the recesses (19) has two opposite substantially convex lateral sides (52, 54) which help the insertion of the projections (18) in the recesses (19).

Referring now to figures 4 and 5 and according to a preferred embodiment of the
 20 invention, each connector (16) comprises a pair of anchor members (20a, 20b), a first one (20a) embedded in the first foam panel (14a) and the second one (20b) embedded in the second foam panel (14b). Each anchor member (20) has an elongated flange plate (22) extending longitudinally and deep inside the foam panel (14) and an elongated link element (24) connected longitudinally to the
 25 flange plate (22) and having a projecting end (26) coming out of the foam panel (14). Preferably, the projecting end (26) of each anchor member (20) comprises

a stabilising plate (28) as best shown in figure 5 parallel to the flange plate (22) and extending flush with the inner surface (30) of the foam panel (14).

In order to lighten the foam panel assembly, the link element (24) preferably comprises a plurality of holes (25) therealong. However, the link element (24)
5 may also be plane solid.

It has to be noted that by saying that the anchor member (20) is embedded in the foam panel (14), a person in the art will understand that in the making of the foam panel (14) in the manufacturing plant, the plastic foam material forming the panel (14) is injected to surround the anchor member (20), thereby
10 strengthening the joint between the panel (14) and the anchor member (20) which thus act as an anchor forming part of the foam panel (14). More specifically, the plastic foam material, which is preferably polystyrene or any other material known to a person skilled in the field of plastic foam, is injected to surround the anchor member (20).

Referring to figure 4, the connector (16) further comprises a web member (32) extending between the foam panels (14). The web member (32) that is preferably made of a relatively flexible plastic comprises a central portion (44) having a shape adapted to receive and hold metal rods used to reinforce the concrete. The web member (32) further has a first longitudinal side end (34a)
15 hingedly connected to the projecting end (26) of the first anchor member (20a) and a second longitudinal side end (34b) opposed to the first longitudinal side end (34a). The second longitudinal side end (34b) is hingedly connected to the projecting end (26) of the second anchor member (20b). The foam panels (14) are movable between an extended position, as shown in figure 1, where the
20 foam panels (14) are spaced-apart to make the form and a collapsed position, not illustrated, where the foam panels (14) are brought close to each other, mainly for shipping purposes.
25

Referring to figures 5 and 6, a plurality of connecting elements (64) preferably disposed on the stabilising plate (28) of the projecting end (26) of each anchor member (20) in order to hingedly connect the web member (32) to the anchor members (20) is illustrated. Each of these connecting elements (64) is shaped
 5 to form two aligned ridges (66) projecting from the stabilising plate (28), and the space between them defined a longitudinal sleeve (68). A joining pin (70) can be mounted in the sleeve (68). Preferably, pin receiving holes (71) are provided in the ridges (66) for this purpose, each hole (71) facing inwardly of the sleeve (68). It will be understood that although the connecting elements are shaped to
 10 form two aligned ridges, the present invention contemplates employing other types of connecting elements that would be apparent to a person skilled in the art, such as open slotted tube-like knuckles.

To cooperate with the connecting elements (64), each longitudinal side end (34a, 34b) of the web member (32) defines a corresponding number of arms
 15 (72). Each arm (72) has an extremity (74) connectable to a corresponding joining pin (70) so as to be rotatable around an axis defined by the joining pin (70). It can be easily seen that this purpose may be achieved by either mounting the extremity (74) of the arm (72) rotatably around the joining pin (70), or mounting the joining pin (70) itself rotatably in the pin receiving holes (71).
 20 Preferably, the extremity (74) of each arm (72) is provided with a bore (76) for receiving one of the pins (70).

As would be readily understood by a person skilled in the art, the connecting elements (64) may be formed directly by molding during manufacturing of the anchor member (20). In the illustrated embodiment of figures 5 and 6, a
 25 protrusion (78) is generated by the molding process on each side of the ridges (66). In the case of corners of a wall where adjacent panels are mounted perpendicularly to each other and where obviously no web member is provided with the connectors, these protrusions, which are embedded in the concrete with the ridges, have the additional advantage of serving as anchor means for the

flanges of the connector in which screws could be inserted to fix, for example, a plasterboard wall thereto.

Therefore, thanks to both the relief of the top and bottom sides of the panels (14) and the connectors (16), the wall form assemblies according to the
5 illustrated preferred embodiment of the present invention can be easily stacked over each other and linked together.

Once a form for receiving flowable material is mounted using a plurality of stacked horizontal rows of form wall assemblies, the empty cavity existing between the form wall made of isolating and rigid panels (14) is filled with
10 concrete or with cement based grout. After hardening of the filling material, a composite wall is obtained with the isolating panels firmly attached through the connectors to the concrete inside-wall.

Although a preferred embodiment of the invention has been described in detail herein and illustrated in the accompanying drawings, it is to be understood that
15 the invention is not limited to this precise embodiment and that various changes and modifications may be effected therein without departing from the scope or spirit of the invention.

CLAIMS

1. A stackable insulating foam panel having a top side and a bottom side each including a median row of alternating projections and recesses having a similar complementary shape, the median row being disposed between two coplanar edge surfaces, each projection of the top side being opposed to a recess of the bottom side whereby the top side and/or the bottom side of the panel can be interconnected with either the top side or the bottom side of a like panel.
2. A foam panel according to claim 1, wherein the similar complementary shape of the projections and the recesses is generally rectangular.
3. A foam panel according to claim 2, wherein the projections have rounded-corners.
4. A foam panel according to claim 3, wherein each of the projections and the recesses has two opposite substantially convex lateral sides.
5. A wall form assembly for receiving a flowable material comprising:
 - a first and a second opposed foam panels in parallel relationship; and
 - a plurality of connectors hingedly tying together the first and second foam panels, whereby the tied foam panels are movable between an extended position where the foam panels are spaced-apart to make the form and a collapsed position where the foam panels are brought close to each other, and wherein

each of the first panel and the second panel has a top side and a bottom side each including a single median row of alternating projections and recesses having a similar complementary shape, the median row being disposed between two coplanar edge surfaces , each projection and recess

of the top side of one panel being opposed respectively to a recess and a projection of the bottom side of the same panel and facing a recess of the other panel when the panels are in the extended position whereby the panels in the extended position can be interconnected with a like pair of panels.

5

6. A wall form assembly according to claim 5, wherein the similar complementary shape of the projections and the recesses of each panel is generally rectangular.

7. A wall form assembly according to claim 6, wherein the projections have rounded-corners.

10

8. A wall form assembly according to claim 7, wherein each of the projections and the recesses has two opposite substantially convex lateral sides.

9. A wall assembly according to claim 5, wherein the connector comprises:

- a pair of anchor members, one being devised to be embedded in the first foam panels and the other being devised to be embedded in the second foam panels, each anchor member having:

15

an elongated flange plate extending longitudinally and deep inside the foam panel; and

an elongated link element connected longitudinally to the flange plate and having a projecting end coming out of the foam panel, and

20

- a web member extending between the first and the second foam panels, the web member having opposite longitudinal side ends, each of said ends being hingedly connectable to said projecting end of either one of said anchor members;

whereby the foam panels are tied together by connecting one side end of the web member to the projecting end of one of said anchor members and the other side end of the web member to the projecting end of the other anchor member, the tied foam panels being thereby movable between an
 5 extended position where the foam panels are spaced-apart to make the form and a collapsed position where the foam panels are brought close to each other.

10. A wall assembly according to claim 9, wherein the projecting end of each anchor member comprises a stabilising plate parallel to the flange plate
 10 extending flush with an inner surface of the foam panel.

11. A wall assembly according to claim 10, wherein

the projecting end of each anchor member comprises a plurality of
 connecting elements disposed on the stabilising plate, each connecting
 element having two aligned ridges projecting from the stabilising plate and
 15 defining a longitudinal sleeve therebetween, and a joining pin longitudinally mountable in said sleeve; and

each longitudinal side end of the web member defines a plurality of arms for
 cooperating with each of the connecting elements, each arm having an
 extremity connectable to the joining pin of a corresponding connecting
 20 element so as to be rotatable around an axis defined by said joining pin, thereby allowing the web member and anchor member to pivot with respect to each other.

12. A wall assembly according to claim 11, wherein the ridges of each
 connecting element each have a pin-receiving hole therein facing inwardly
 25 of the sleeve for receiving an end of the joining pin.

- [illegible]

ABSTRACT

A stackable insulating foam panel which has a top side and a bottom side. Each of the panels has a median row of alternating projections and recesses with a similar complementary shape. The median row is disposed between two coplanar edge surfaces. Each projection of the top side is opposed to a recess of the bottom side whereby the top side and/or the bottom side of the panel can be interconnected with either the top side or the bottom side of a like panel. The present invention also concerns a wall form assembly which comprises opposed foam panels disposed in parallel relationship to make a wall form for receiving a flowable material such as concrete and a plurality of connectors for tying the opposed foam panels together.

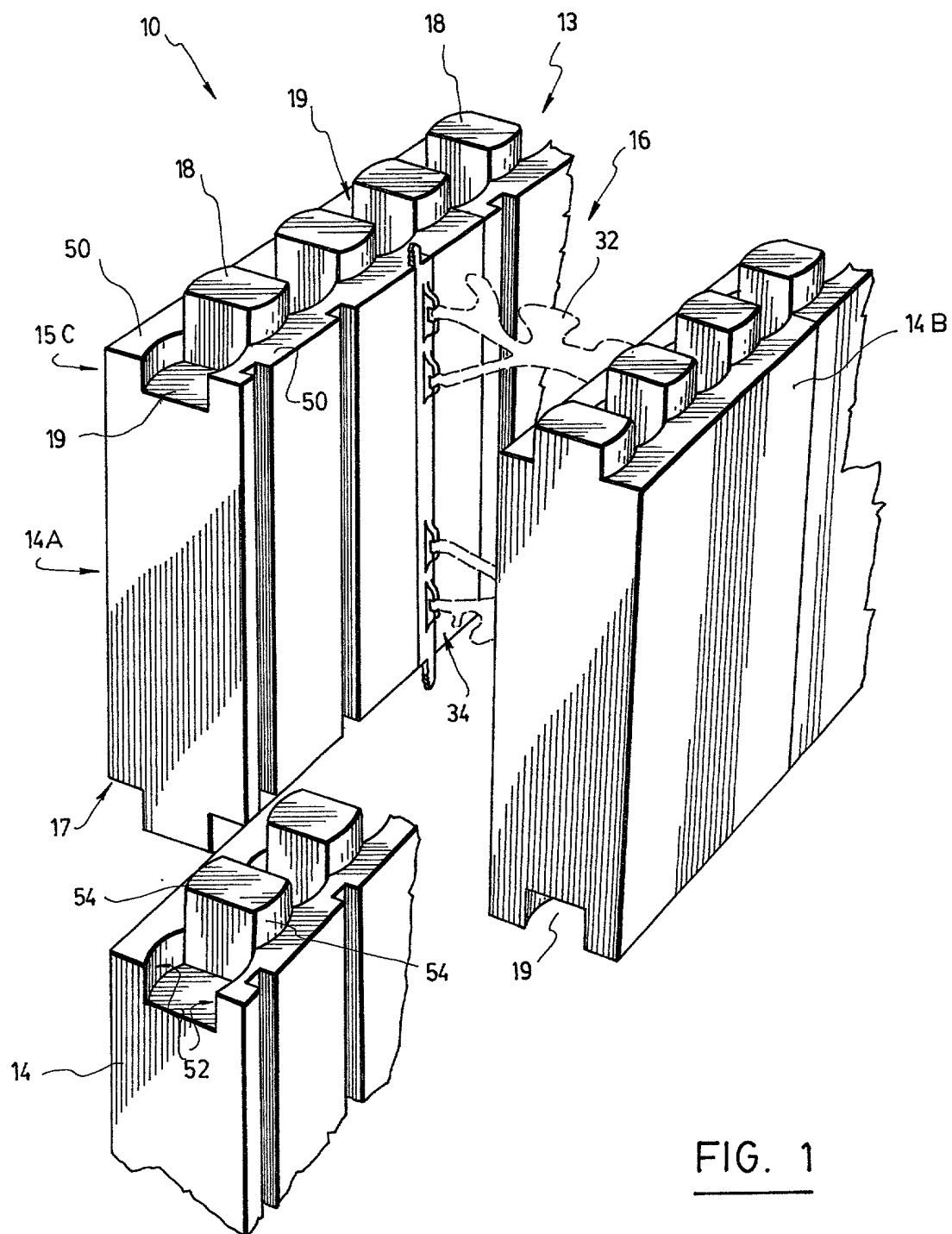


FIG. 1

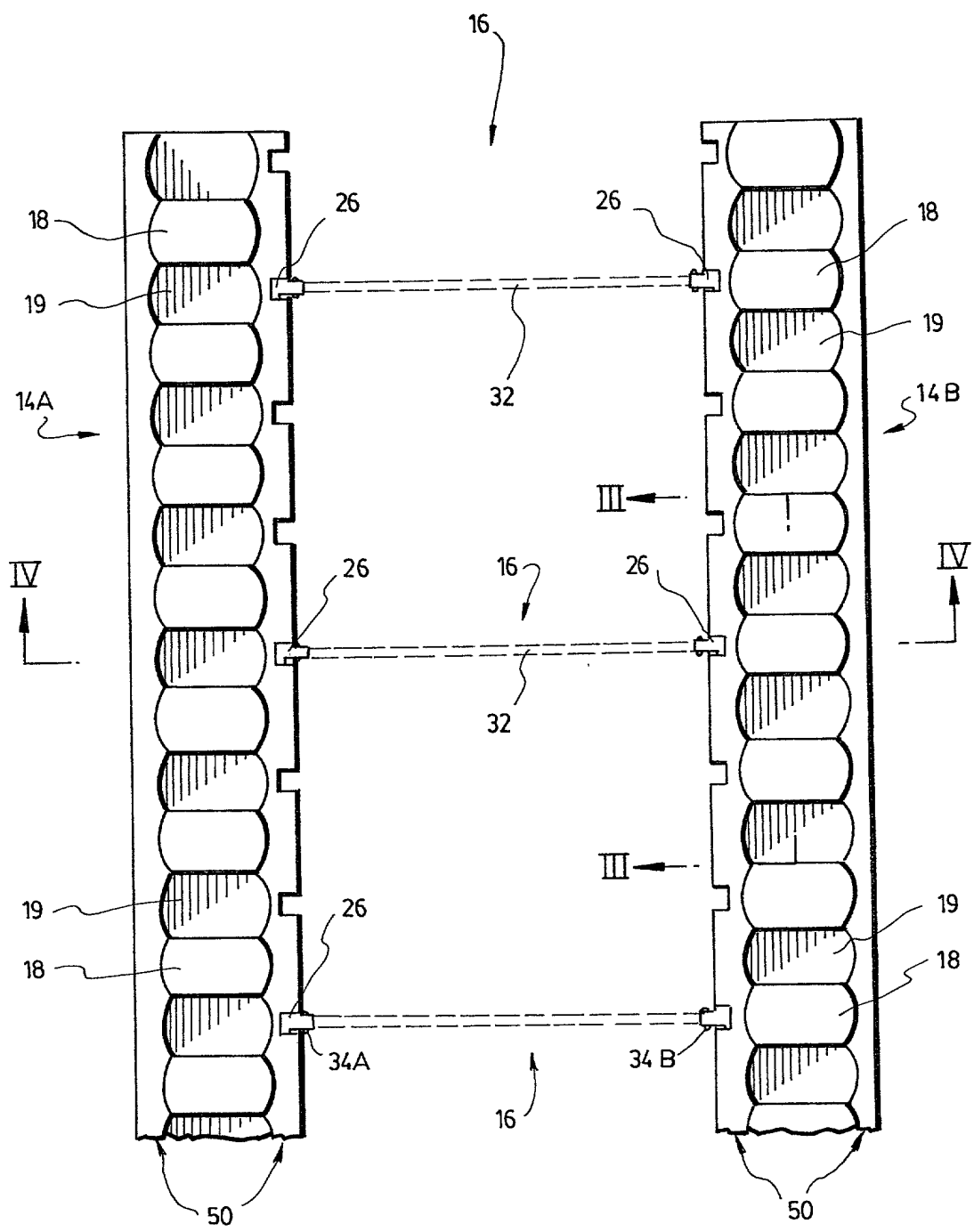


FIG. 2

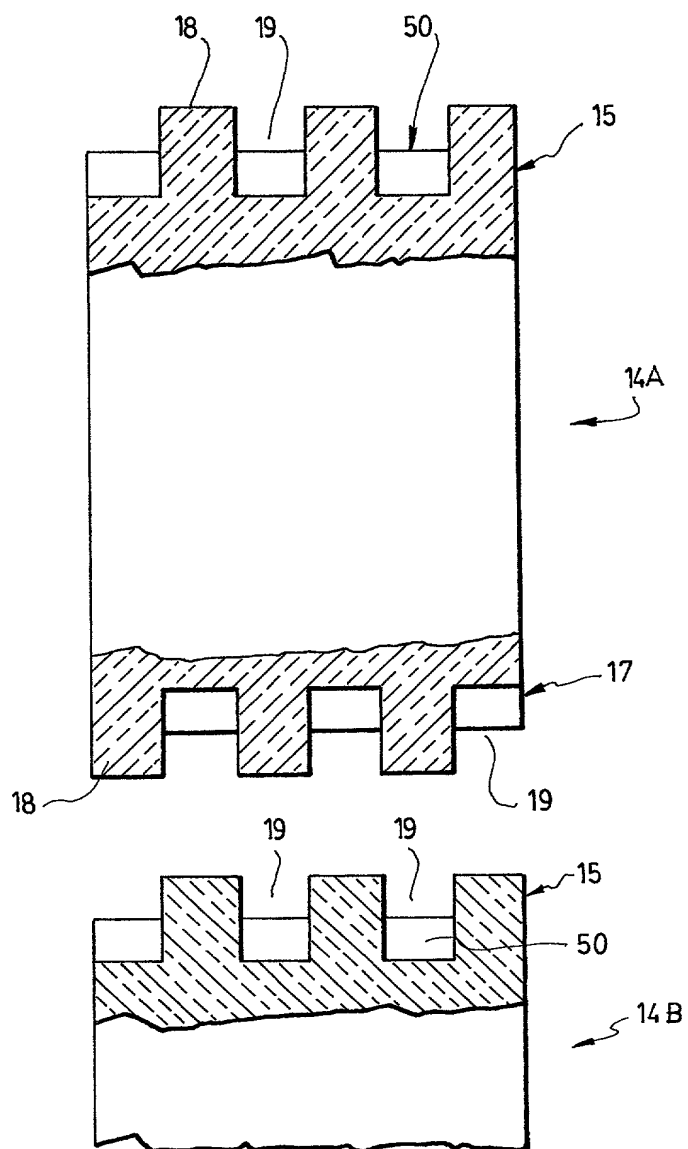


FIG. 3

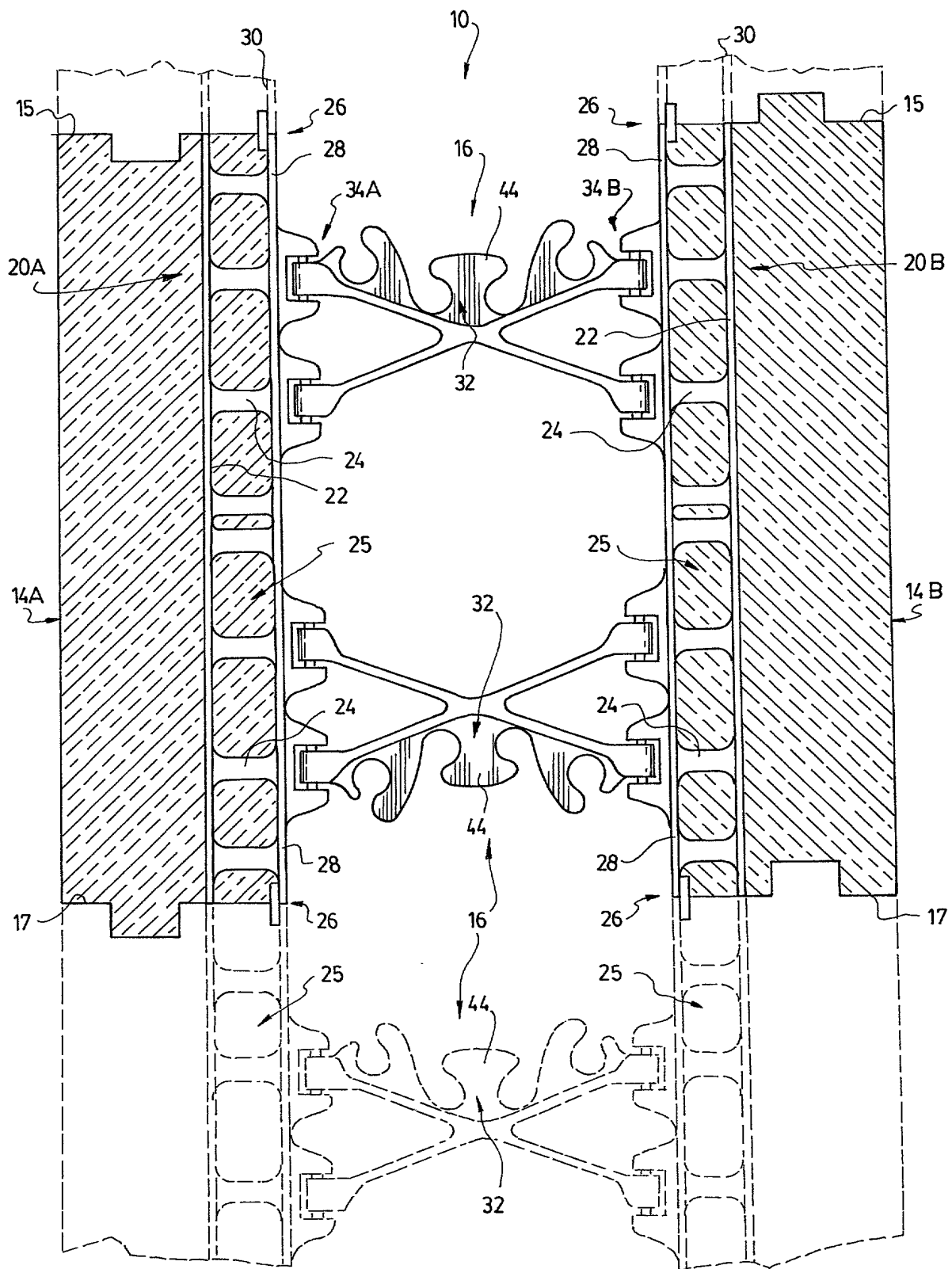


FIG. 4

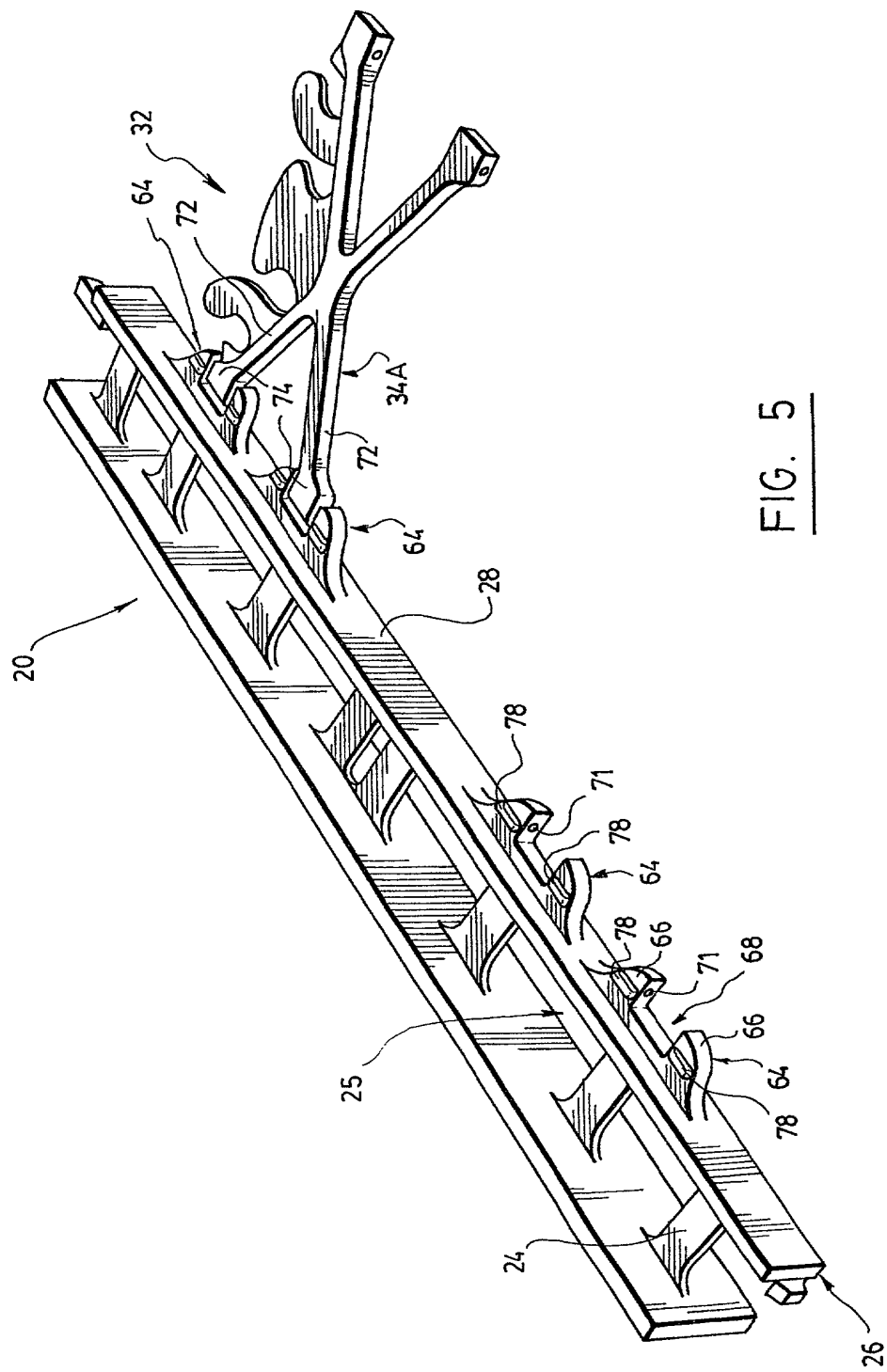


FIG. 5

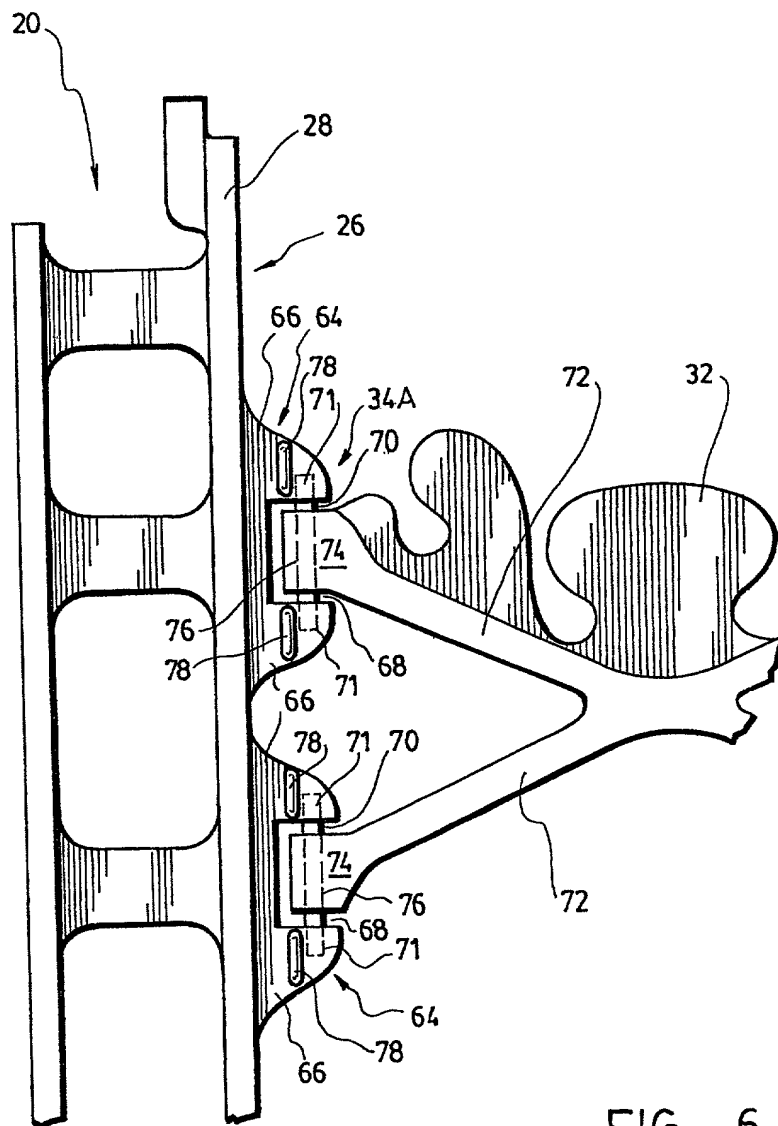


FIG. 6

DECLARATION FOR PATENT APPLICATION

As a below named inventor, I (we) hereby declare that my (our) residence, post office address and citizenship are as stated below next to my (our) name; I (we) believe that I am (we are) the original, first and sole inventor(s) (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention (Design, if applicable) entitled:

STACKABLE CONSTRUCTION PANEL

the specification of which (check one): X is attached hereto; _____ was filed on _____ as application serial No. _____ and was amended on (or amended through) _____ (if applicable); was filed on _____ as International Application (PCT) No. _____ and amended on _____ (if applicable). I (we) hereby state that I (we) have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment(s) referred to above. I (we) acknowledge the duty to disclose information known by me (us) to be material to the patentability of my (our) invention in accordance with Title 37, Code of Federal Regulations, § 1.56(a). I (we) hereby claim foreign priority benefits under Title 35, United States Code § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application which priority is claimed.

I (We) hereby claim foreign priority benefits under Title 35, United States Code § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application which priority is claimed.

Prior Foreign Application(s)			Priority Claimed	
2,298,170	CANADA	11 February 2000	X	
(Number)	(Country)	(Day/Month/Year Filed)	YES	NO
(Number)	(Country)	(Day/Month/Year Filed)	YES	NO

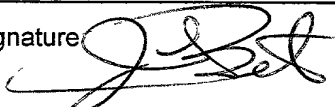
I (we) hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code § 112, I (we) acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56 which occurred between the filing date of the prior art application and the national or PCT international filing date of this application:

(Appl. No.)	(Filing date)	(Status-Patented, Pending or Aband.)
(Appl. No.)	(Filing date)	(Status-Patented, Pending or Aband.)

I (we) hereby declare that all statements made herein of my (our) own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: I (we) hereby appoint as my (our) attorneys, with full powers of substitution and revocation, to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

Garabed NAHABEDIAN (Reg. No. 29,507); Thierry ORLHAC (Reg. No. 29,497); Alain PROVOST (Reg. No. 33,143), Nathalie JODOIN (Reg. No. 41,558), Louis-Pierre GRAVELLE (Reg. No. 44,429) and Luc MORIN (Reg. No. 44,430), whose professional address is 55 St Jacques, Montreal, Quebec, Canada, H2Y 3X2.

Full name of First or Sole Inventor Jean-Louis BÉLIVEAU	Citizenship Canadian
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City Magog	City Magog
State or Country Zip Québec, CANADA J1X 3W4	State or Country Zip Québec, CANADA J1X 3W4
Date 12/06/00	Signature 

12/06/00 1485 chemin Georgeville Magog Québec, CANADA J1X 3W4